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ABSTRACT

Following Walter Nord (1969), the present article contains a predictive model of individual behavior based on both operant conditioning and management literatures. The behavior of an organizational member is seen as a function of the reinforcement contingencies applied by various groups in his environment and of his cognitive assessment of such contingencies. Several characteristics of reinforcement contingencies are examined, e.g., positive vs. negative reinforcement, schedules of reinforcement, and immediacy of reinforcement. The model provides a potentially useful scheme for classifying environmental contingencies operating on a member of an organization and for predicting their varied effects on behavior. (Author)

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Center for Social Organization of Schools

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REPORT No. 102

APPLYING OPERANT CONDITIONING PRINCIPLES TO THE MANAGEMENT OF ORGANIZATIONS

BY

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STEPHEN F. JABLONSKY

The Johns Hopkins University

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INTRODUCTORY STATEMENT

The Center for Social Organization of Schools has two primary objectives: to develop a scientific knowledge of how schools affect their students, and to use this knowledge to develop better school practices and organization.

The Center works through five programs to achieve its objectives. The Academic Games program has developed simulation games for use in the classroom, and is studying the processes through which games teach and evaluating the effects of games on student learning. The Social Accounts program is examining how a student's education affects his actual occupational attainment, and how education results in different vocational outcomes for blacks and whites. The Talents and Competencies program is studying the effects of educational experience on a wide range of human talents, competencies and personal dispositions, in order to formulate -- and research -- important educational goals other than traditional academic achievement. The School Organization program is currently concerned with the effects of student participation in social and educational decision making, the structure of competition and cooperation, formal reward systems, ability-grouping in schools, effects of school quality, and applications of expectation theory in the schools. The Careers and Curricula program bases its work upon a theory of career development. It has developed a self-administered vocational guidance device to promote vocational development and to foster satisfying curricular decisions for high school, college, and adult populations.

This report, prepared by the School Organization program, presents an application of operant conditioning principles to the theory and practice of managing organizations. The model will be used in subsequent studies of the effects of organizational forms in secondary schools.

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Introduction

Individual behavior in organizational settings has generally been viewed in the ahistorical, humanistic perspective of such men as McGregor (1966) or Maslow (1965). An alternative and potentially useful model has recently been outlined by Walter Nord (1969). He examines such behavior in light of the developmental, behavioristic environmentalism of B. F. Skinner (1953) and other learning theorists, e.g., Bijou and Baer, 1961; Reese, 1966. Nord's alternative perspective is based on certain empirical generalizations adopted from the operant conditioning literature (cf. Honig, 1966; Reynolds, 1968). His model is interesting but weak in certain respects. The purpose of the present paper is to expand the Nord model and to examine in greater detail its implications for the study of organizations, particularly educational organizations.

The Operant Conditioning Model

Operant conditioning as a science of behavior rests on the basic assumption that an individual learns mainly by producing changes in his environment (Skinner, 1954). An individual who is not able to make any systematic changes in his environment is not likely to change his behavior to any significant degree. The task of operant conditioners has been to manipulate carefully various environmental dimensions and examine their differential effects on individual behavior.

The dependent variables of interest to operant conditioners are operant responses or behaviors (Reynolds, 1968). An operant response is one which changes the environment in some way. Operant behaviors

are not elicited by environmental forces. However, the frequency of occurrence of an operant is greatly influenced by its environmental consequences. The vocal babbling of an infant, the monkey swinging from tree to tree, the worker operating a punch press are all examples of operant behaviors. Much of the behavior of higher organisms is operant.

The independent variables of interest in operant conditioning are the environmental consequences of an individual's operant behaviors. These environmental consequences -- which in turn affect subsequent operant behaviors -- are viewed (e.g., Skinner, 1953) both within a contemporary and historical perspective. This is in contrast to the approaches of McGregor (1966), Maslow (1965) and most other organization theorists, which treat and manipulate only contemporary environmental determinants. By incorporating an historical perspective into the analysis, one can explain the large individual differences frequently noted in response to various environmental stimuli. For example, the large individual differences noted by House and Wigdor (1967) in the effects of certain job characteristics on the satisfaction of individual workers may well be due to vastly different learning histories. Although these histories must be taken as given, new learning experiences can be structured in order to minimize such differences.

Operant conditioning refers to a process in which characteristics of operant behavior are, over time, modified by the environmental

consequences of the behavior.[1] Various characteristics of an individual's response may be modified. The rate, latency, probability, and topography (e.g., with which leg does the rat hit the lever) have all been successfully manipulated in operant conditioning experiments. Operant conditioning is not limited to manipulating mere quantitative characteristics of responses; qualitative characteristics have also been changed. An elaborate experimental process called "shaping" (Reynolds, 1968) specifies various ways of using combinations of environmental contingencies to change single existing responses into new and more complex responses.

The environmental consequences may be classified as one of three types: positive reinforcers (rewards), negative reinforcers (punishments) or neutral stimuli. If the environmental consequence is applied to a given operant behavior and increases the rate of the response, it is termed a positive reinforcer. If an environmental consequence, by its disappearance, increases the response rate, it is a negative reinforcer. If it produces no change in probability, the environmental event is considered a neutral stimulus. Both positive and negative reinforcers can be either primary (effects independent of past experience) or secondary (past experience influences effects). Examples of primary negative reinforcers are high levels of electric shock and long periods of isolation; verbal praise and job advancement are examples of secondary positive reinforcers.

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[1]The classic example of the experimental design of such a process is that of the rat in a small experimental chamber in which the only manipulable feature is a lever mounted on a wall. If the rat pushes the lever with a certain amount of force a food pellet is dropped into the box. In this case the characteristic of interest may be the frequency with which the operant behavior (pushing the bar) is emitted. The environmental contingency which acts as the reinforcer is the administering of the food pellet after the bar is pushed.

It is obvious that the environmental contingencies which act as rewards or punishments for members of organizations and are manipulated by the organizations are mainly secondary reinforcers. For example, the effects of salary increases, increased span of control, verbal praise, and demotions are all mediated to a great extent by the individual's history of experiences. Operant conditioning research has shown (Allyon and Azrin, 1968) that in spite of large individual differences in experience with a given secondary reinforcer, some reinforcers can restructure significantly the behavior of all the individuals. According to the operant conditioners (e.g., Skinner, 1954), establishing a history of systematic relations between the environmental event (e.g., salary increase) and the desired behavior (e.g., increase in performance) can frequently wipe out the individual differences that may exist in the value attached to the secondary reinforcer.[1]

Operant Conditioning Principles

Since the early 1950's, a large number of experimental studies have been conducted within the operant conditioning framework.[2] The

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[1]Vroom (1964) and others (Galbraith and Cummings, 1967) have shown that perceptions of the instrumentality of the operant behavior in achieving the desired positive reinforcer as well as the valence of the reinforcer vary across individuals and predict subsequent performance. Contrary to popular myths, such findings do not invalidate the operant model. Such differences are inevitable given different histories of establishing operant responses. Rather than merely accepting such differences in perceptions as given (as in Vroom's ahistorical model), the operant developmental model suggests why such perceptual differences exist and how they might be modified. Unfortunately the blinders of S-R behaviorism have prevented operant conditioners from dealing more specifically at both the theoretical and empirical levels with cognitive variables (cf. Dulany, 1968).

[2]For recent and complete reviews of the operant conditioning literature, such texts as Skinner (1969), Reese (1968), Reynolds (1968), Ferster and Perrot (1968) are recommended. Honig (1966), Allyon and Azrin (1968), and Neisworth, et al (1969) all provide readers with successful applications of operant conditioning practices within either mental health or educational organizations.

principles examined by those studies typically hold for both human and lower-than-human organisms and for different types and levels of reinforcers. The level of cross-validation is impressive and suggests that the principles have great potential for predicting human behavior. The following paragraphs list several dimensions of environmental phenomena which have been empirically shown to be systematically related to changes in individual behavior.

Schedule of Reinforcement

Reinforcement schedules describe the degree of regularity with which certain reinforcements (environmental events) follow certain classes of operant responses. Reinforcement schedules can be either continuous -- consequence (c) follows behavior (b) every time -- or partial -- c follows b some of the time. Within partial reinforcement schedules, the reinforcement can occur either on a ratio basis, in which c follows every nth b, or an interval basis, in which c occurs after b only after a given interval of time has elapsed (Reynolds, 1968).

Both the ratio and interval schedules can be either fixed or variable. A fixed ratio schedule is one in which the number of responses required for c to occur is constant from one reinforcement to the next, whereas variable ratio varies the required number of responses from one reinforcement to the next. In a fixed interval schedule, the time that must elapse before a response can be reinforced is constant from one interval to the next. In a variable interval schedule, the time

varies across reinforcements.[1]

As suggested in Catania (1968), the various schedules strongly predict the performance characteristics of the operant behavior on which the reinforcement is contingent:

1. Behaviors acquired under partial reinforcement continue for longer periods of time once the positive reinforcement is discontinued than do behaviors acquired under continuous reinforcement (Underwood, 1966).

2. To reach certain performance levels, partial reinforcement requires more trials but fewer reinforcements than does continuous reinforcement (Kanfer, 1954).

3. The response rate is more constant (fewer rest breaks) under both variable ratio and variable interval schedules than under fixed ratio and fixed interval (Logan and Wagner, 1965).

4. The variable ratio schedule produces very high rates of responding and the steadiest rate of performance without breaks (Reynolds, 1968).

Delay of Reinforcement

Immediacy of reinforcement is considered by many to be an essential concept of learning theory. Experiments suggest that if reinforcement does not occur immediately after the response occurs, it is much less effective in changing behavior. The reduced effectiveness is due to the fact that a delayed reinforcement may be reinforcing behaviors which have occurred after the desired behaviors. For example, a new teacher in a large secondary school may perform initially at a high level, trying to impress his principal. His superiors may attempt to

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[1]This delineation of schedules of reinforcement by no means exhausts the various types of reinforcement schedules. Neither does it necessarily include the schedules which appear most frequently in real-life settings. The schedules listed appear precisely because their effects on behavior rates have been noted in experimental settings.

reward him for this extra effort by raising his salary. However, the request may not be approved until months later. By this time the teacher's high level of motivation has likely been extinguished, and when the salary increase finally occurs, the teacher is, in effect, being reinforced for mediocre performance.

Punishment

Punishment is the presentation of an aversive environmental event which is made contingent upon the occurrence of a given operant response (Reynolds, 1968). Examples of aversive or noxious consequences are placing an individual in a very hot and humid room, or subjecting him to high levels of electric shock or to a high decibel level of noise. A parent spanking his child or a principal insulting the performance of one of his teachers are examples of social aversive consequences.

Does punishment have any effect on the behavior it follows? The answer to such a question is quite obviously "yes". However, Skinner (1953), Bandura and Walters (1964) and other operant conditioners suggest that although punishment may suppress a response, it does not necessarily abolish it. That is, when the punishment is discontinued, the rate of response frequently increases to a level higher than that maintained before punishment occurred. For example, if a foreman ridicules one of his employees for telling jokes to his peers, the employee may not repeat the behavior while the foreman is around. Once the foreman leaves the work area, however, the inappropriate behavior is likely to reappear.

Punishment may not always produce an immediate decrease in the response rate. As suggested by Reynolds (1968), the rate of behavior

will increase in the presence of punishment if the response is punished only on those occasions when it is also reinforced. In organizations which use punishment as a primary means of controlling member behavior, such instances might occur frequently. For example, a student in a classroom may get the teacher's attention only by exhibiting some inappropriate behavior, such as having failed to do his homework. Although the teacher may punish such a response (e.g., attempt to shame the student) the student is likely to receive simultaneously positive reinforcements from his peers in the form of admiration. A series of studies by Alexander and Epstein (1969) suggests that students may gain respect for one of their peers when he is punished by his teachers.

Another undesirable effect of punishment is that the source of the reinforcements, e.g., the teacher or supervisor, becomes associated with the punishment and eventually takes on an aversive quality also. Such aversive properties may extend to the entire behavioral situation. Consequently a student who has experienced only punishment in school may become a chronic skipper in order to avoid the punishing situation. Such an "avoidance" response has been observed in learning experiments and is to be expected on the part of organizational members to whom the organization responds primarily or entirely with punishing consequences.

Granted that punishment may have undesirable side effects, organizations must still attempt to reduce disruptive behaviors by its members. Skinner proposes the extinction procedure, which involves eliminating the positive reinforcements which follow the response.

For example, if a student spends his time in class telling off-color jokes to his fellow students instead of working, one should make sure that no one laughs at the jokes. Lacking the reinforcement that had previously sustained his behavior, the storyteller should soon refrain from such behavior.

Shaping

A frequent objection to operant conditioning as a means of changing individual behavior is that it can affect the frequency of occurrence of relatively simple responses only. The principle of shaping, however, contradicts such a contention. Shaping is a process which uses a combination of reinforcement and nonreinforcement to change simple existing responses into new and more complex responses. By using this principle in the experimental setting, organisms have been taught extremely complex responses. For example, two- or three-year-old children have been taught to type reasonably well (Reynolds, 1968).

The technique of shaping begins with reinforcing positively an operant which is a part of the total desired response. Once this response begins to occur reasonably often, the topography of the required response is changed slightly. For example, the child may initially be reinforced for merely striking the keys on the typewriter, then the desired response may change to striking the keys in a certain order. How many steps are required before obtaining the final desired behavior is a function of both the complexity of the goal behavior and the initial level of performance of the individual.

In summary, operant conditioners are concerned with certain learned behaviors of individuals, and with the subsequent environmental events which are contingent on the behaviors. These relationships are summarized by Figure 1.

Operant Conditioning--Management Style

Frame of Reference

Nord portrays organizational behavior as an exchange, with the participant being reinforced by an organizational superior. The exchange process is viewed from the managerial perspective. According to Nord, the superior in the superior-subordinate relationship specifies the required behaviors of the subordinates. The behaviors are a function of what the manager perceives as desirable responses. Nord feels that application of operant conditioning principles to an organizational context will benefit the managers, allowing them to predict and control the behavior of organizational participants.

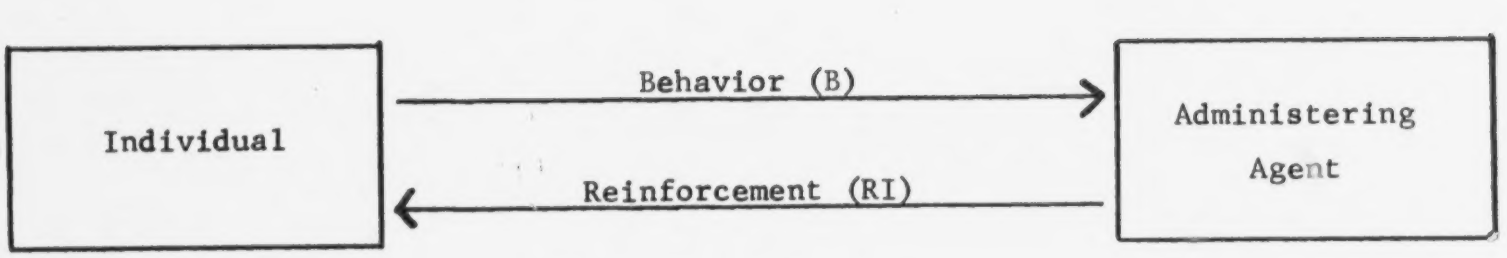
Understanding Through the Model

Nord's operant conditioning model of organizational functioning has not been subjected to rigorous empirical tests. He has extrapolated some principles from behavior observed in highly controlled and experimental settings. With these principles he attempts to reinterpret some traditional management concepts.

Nord offers the operant conditioning model as an alternative to the normative theories of McGregor (1960) and Herzberg (1968) related to job design. McGregor has suggested "job enlargement" and Herzberg

Figure 1

The Operant Conditioning Model



has suggested "job enrichment" as strategies for increasing employee motivation (an internal state). Nord would rather ignore the internal state and explain the results suggested by McGregor and Herzberg in terms of operant conditioning theory. He would translate increased motivation into objectively measurable criteria -- higher rates of desired behavior resulting from a program of positive reinforcement.

As an alternative hypothesis to the proposition that job enlargement is related to feelings of responsibility or achievement, Nord suggests that stimulation from engaging in more activities is itself reinforcing (rewarding). This intrinsic reward (stimulation) then accounts for an increase in the rate of behavior.

In a similar attack on Herzberg's theory of job enrichment, Nord does not accept the explanation that giving individuals challenging assignments will result in "feelings of achievement and responsibility," which will lead to an increase in motivation. Rather, the individual's rate of performance may increase because he completes a job which perhaps had a high probability of failure. The reinforcement is the completion of the job.

On an a priori basis, each of the three theories (Nord's, McGregor's or Herzberg's) is as credible as another. The value of the theories to the study of organizations will depend upon the empirical validity and practicality of each.

Critical Propositions

The model which Nord proposes contains several propositions concerning human behavior which have varying degrees of face and

empirical validity. First, it is assumed that individual human behavior is very much a function of, or is controlled by, environmental stimuli, and that forces internal to the individual have little if any effect on the operant behavior. The operant conditioning literature (cf. Honig, 1966) strongly supports the contention that environmental contingencies (both positive and negative) have a direct and strong effect on animal and human behavior. However, empirical evidence provided by Dulany (1968) and Spielberger and DeNike (1966) suggests that operant behavior, particularly if verbal, is also a function of certain cognitive and affective variables residing in the individual. The conclusion from these results is that the determinants of human behavior are interactive, that is, an examination of both situational and intra-individual determinants of human behavior will provide a stronger prediction of human behavior.

A second proposition in Nord's operant conditioning model is that novel human responses never emerge suddenly, but that responses are always the outcome of a relatively prolonged process of operant conditioning. As Skinner (1953) states, operant behavior " . . . is the result of a continuous shaping process." It is obvious that much of human behavior is not formed by such a laborious, time-consuming, shaping process. For example, when a new employee is hired on a production line, he is typically shown how to perform the task and is expected to perform the task properly in a relatively short time. The example points to another mode of learning ignored by Nord, namely imitation. The new employee is shown the task and typically

acquires the complete novel response in one or two trials, particularly if the production line task has relatively few behavioral steps. Bandura and Walters (1964) review a large literature of empirical studies which support the concept of imitative learning. Through such studies an intricate network of relationships have been formed around imitative behavior. For example, several characteristics of the person being imitated (prestige, competence, status, age) as well as of the imitator (previous history of reinforcement for compliant behavior) have been shown to be related to the degree of imitative behavior. Through imitation an individual may well learn a large segment of new behavior without necessarily receiving any direct reinforcement for his new behavior.

The third proposition of Nord's model is that the individual employee's behavior is directly and completely a function of the employer's reward structures. Nord fails to recognize that an employee's work-related behaviors may also be influenced by the reward contingencies established by, among others, his peer group (unions, professional associations, etc.). For example, co-workers can administer contingencies which operate informally through union requirements. As suggested in the Hawthorne research, such contingencies may be independent of, or run counter to, those contingencies exerted by management. A given employee may well have multiple reward and punishment contingencies directed at him from various points. Such multiple interpersonal contingencies have been treated theoretically under the concept of multiple role sets (Katz and Kahn, 1966). When the multiple reward contingencies are rewarding contradictory behaviors

for a given individual, such a person is said to have intersender role conflict. Although the number of different relevant role sets will vary across individuals, the importance of the concept lies in the recognition that a systematic set of contingencies applied by management to an employee's behavior may be distorted by mediating variables.

Having more than one reinforcing agent can produce a conflict situation where behavior may be rewarded by one agent and punished by another. If the theory only recognizes one administering agent, situations where rates of behavior are contingent upon multiple reinforcements cannot be adequately explained. By recognizing other administering agents, the operant conditioning theory could possibly predict a change in the rate of behavior by analyzing the historical relationships between the individual and the various administering agents, the strength of the reinforcements used, and the reinforcement schedules "employed" by the various agents (e.g., continuous observance versus partial observance).

Although Nord treats his model as one appropriate to organizations, he does not treat group performance directly as a dependent variable. It is obvious that in many organizations the relevant level of output is group, not individual, performance. Can reinforcement contingencies be applied to group behavior as well, and does such behavior respond similarly to environmental contingencies? Glaser and Klaus (1966) have performed a series of classic studies attempting to answer such questions. They compared team responses (of 3 member groups) with individual responses and concluded that team response does vary as a function of reinforcement contingencies, although such variations are not as sensitive

to the environment as for the individual member responses. They also suggest that the particular type of task structure (i.e., whether or not there is a redundant member) mediates the effect of the reinforcement. In short, although group responses are sensitive to environmental contingencies, certain structural properties of the group may well affect that sensitivity.

General Critique of Nord's Model

Nord provides a valuable application of the operant conditioning model to the organizational literature. He notes the great concern of management literature with personal variables and provides a framework which posits systematic relationships between individual behavior and forces in the environment. The learning model provides a valuable developmental or historical perspective.

However, Nord's conditioning model is insufficient in several respects. As noted earlier, Nord implies the uselessness of considering such intrapersonal variables as awareness of the reinforcement contingencies or value placed on the reinforcement by the individual. But such individual variables have been shown to influence behavior, independent of environmental contingencies. This suggests the importance of inserting such mediating variables into the operant conditioning framework.

Another notable omission by Nord is the mode of learning termed "imitation." Imitation, in which the individual acquires large segments of new behavior without any necessary direct reinforcement, is an important principle utilized particularly by management personnel.

Another criticism of the model lies in its assumption that there is only one administering agent for reinforcers. Nord himself suggests that peer groups (co-workers, unions, etc.) can be an important source of reinforcements. Therefore, the model has to be expanded to encompass at least one more class of administering agents -- the peer group.

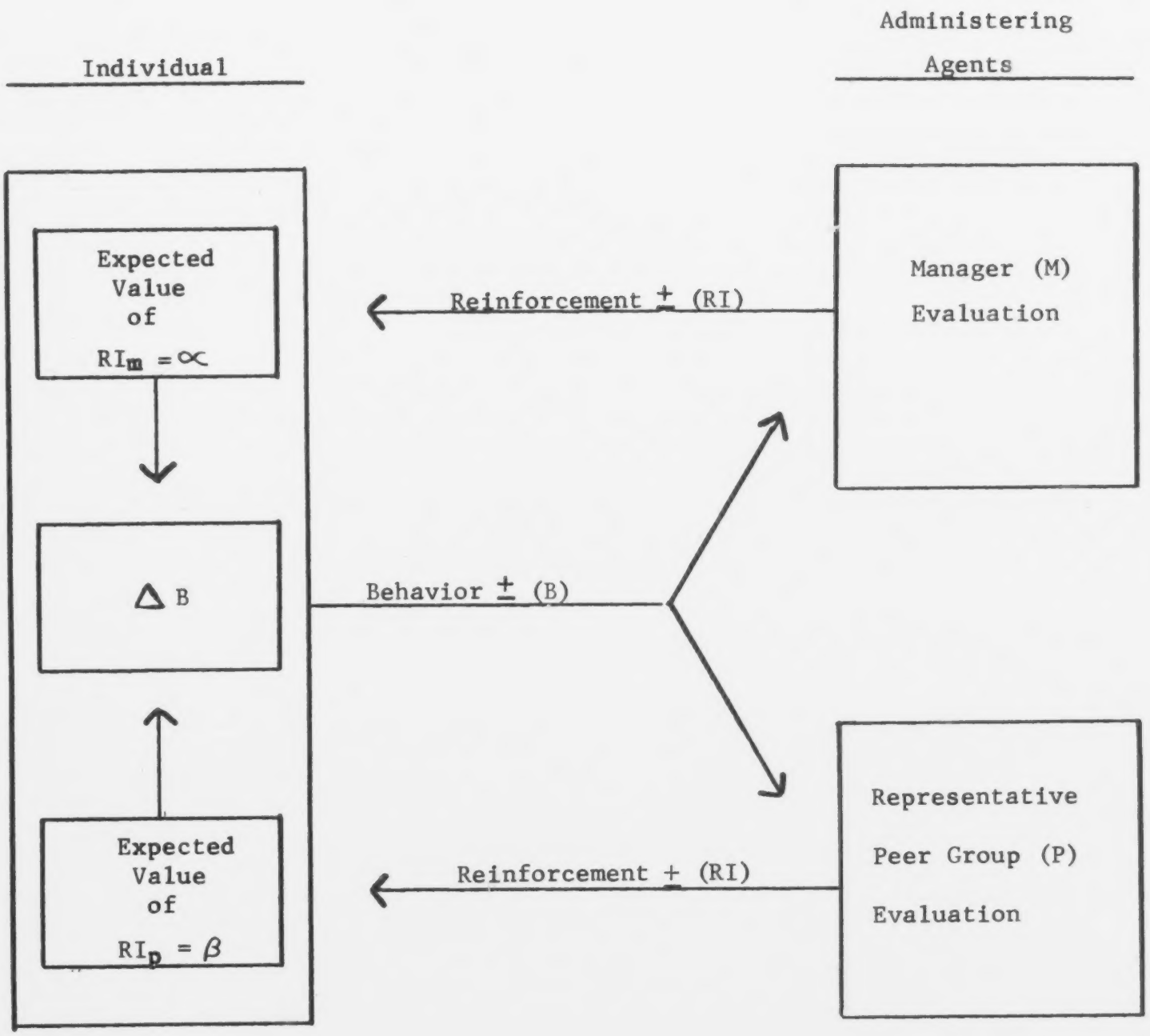
A final major criticism of the model is the fact that it seems to deal with only a particular subset of all behaviors and the associated contingencies. In that respect the model seems to be a carry-over from the controlled setting of the laboratory. An organizational participant evokes an entire set of behaviors that cannot be isolated and examined out of context. If the operant conditioning theory is to make a contribution to the theory of management, the operant conditioning model should predict changes in net behavior.

An Extended Operant Conditioning Model

By incorporating the criticisms of the model discussed above into a new conceptualization of the operant conditioning model, we arrive at an open systems model that still resembles the initial model. The new operant conditioning system is shown in Figure 2. The two-person exchange in the initial model is replaced by a multi-person exchange with the introduction of a peer group or groups. Also, in the initial model the results of the operant conditioning process could be verified by ignoring the cognitive processes within the individual. Implicitly, the model was based on the assumption that no mediating or intervening variables could distort the behavior-reinforcement-change in the rate of behavior sequence.

Figure 2

An Extended Operant Conditioning System



Where

+B = behavior desired by the manager

-B = behavior not desired by the manager

+RI = positive reinforcement

-RI = negative reinforcement

$\propto$ = expected balue of RI_m

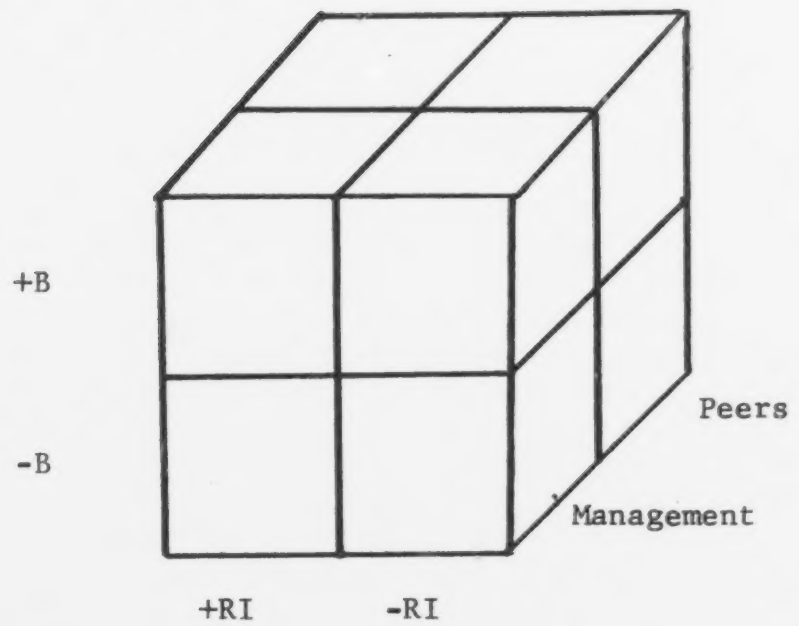
β = expected value of RI_p

where the expected value of an RI equals the absolute value of the reinforcement times the perceived contingency between B and RI

Δ B = change in the rate of behavior

Figure 3

An Operant Conditioning Matrix



3a. Three-dimensional matrix

Behavior Desired by Management (+B)

IV	III	Peers
I	II	Management
+RI	-RI	

Behavior Not Desired by Management (-B)

VIII	VII	Peers
V	VI	Management
+RI	-RI	

3b. Two two-dimensional matrices

With more than one administering agent and more than one reinforcement, perceptual measurements must be taken to determine the net effect of simultaneous reinforcements. For each reinforcement, an expected value (α or β) can be computed which equals the absolute value of the reward times the perceived contingency between the behavior and the reinforcement. Since the reinforcing strength of the various contingencies (e.g., grades, promotion, esteem) will vary across individuals (cf. Dulany, 1968), the assignment of value to the reinforcements by the individual will add to the predictive power of the model.

If the behavior can be dichotomized into behavior desired by management (+B) and not desired by management (-B); and reinforcement is either positive (+RI) or negative (-RI), then organizational behavior can be described as a three-dimensional matrix with eight cells as shown in Figure 3a.

Of the eight cells, six are relevant to the operant conditioning system and two are inconsistent with the theory. By partitioning the matrix horizontally (as shown in figure 3b), two 2-dimensional matrices are created -- one for behavior desired by management and one for behavior not desired by management.

The combinations of quadrants I and IV and VI and VII represent combinations of contingencies by management and peer groups. Both positively reinforce behavior desired by management and both negatively reinforce behavior not desired by management. Combinations of quadrants I and III and VI and VIII represent conflict situations where opposite reinforcements are administered by management and the peer groups.

Quadrants II and V represent inconsistent or accidental contingencies (e.g., the manager negatively reinforcing a behavior he desires, Quadrant II). Incidentally, although Quadrants II and V may be inconsistent contingencies, they may still occur frequently in organizations. Organizations in which desired member behavior is not clearly specified may inadvertently give positive reinforcement to inappropriate behavior. This may be one reason for the recent emphasis on establishing "behavioral objectives" in educational organizations, among others.

Algebraic Representation of the Operant System

The open systems representation of the operant conditioning system is helpful in describing the logic of the model, and the matrix representation helps to intuitively identify the possible combinations of behaviors, reinforcements, and administering agents. The next step is to develop an algebraic representation of the operant conditioning system in order to account for a change in net behavior (i.e. the sum of changes in the rate of individual behaviors).

If behavior (B) is thought of as the number of responses made during a standard time period, then operant conditioning is the process of changing the number of responses in the standard unit of time. The current response rate is a function of the current reinforcements and their associated expected values to the individual.

$$B = f(\alpha RI_m, \beta RI_p) \qquad (1)$$

To convert the function into an equation, an assumption is made that individuals tend to weight[1] the various contingencies through a summative process rather than choose either one or the other in an absolute sense; therefore, the operant equation for a single type of behavior is

$$B = \alpha RI_m + \beta RI_p \qquad (2)$$

where RI_m and RI_p equal either (+1) for positive reinforcement or (-1) for negative reinforcement.

A change in the rate of behavior then can be expressed as

$$\Delta B = \alpha \Delta RI_m + \beta \Delta RI_p \qquad (3)$$

Total behavior could be described as the sum of all individual behaviors or total performance (P).

$$P = \sum_{i=1}^{n} (\alpha_i RI_{m_i} + \beta_i RI_{p_i}) \qquad (4)$$

where $i = 1 \rightarrow n$; set of all behaviors.

However, net behavior, a change in performance ΔP, could not be described by simply inserting appropriate change symbols. An additional coefficient (γ) is needed to specify the relative value of a specific behavior with respect to total performance. For example, the behavior "punctual attendance" may be valued relatively low in comparison to the behavior "completes reports on time."

The final algebraic representation of the extended operant system would be

$$\Delta P = \sum_{i=1}^{n} \gamma_i (\alpha_i \Delta RI_{m_i} + \beta_i \Delta RI_{p_i}) \qquad (5)$$

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[1] Determinants of the value placed on the reinforcement might include the level and frequency with which the individual reinforcement has been administered to the individual in the past.

where P = change in net behavior

γ = relative value of a specific behavior B_i; the sum of the γ_i values equals 1.

α = the expected value of the managerial reinforcement

β = the expected value of the peer group reinforcement

RI = reinforcement is either positive (+1) or negative (-1)

M = manager

P = peer group

i = 1→n; set of possible behavioral alternatives

Implications for Organizational Theory

The model (5) predicts the amount of behavioral change one can expect of an individual operating within an organization. The model draws on both learning and instrumentality theory. This model (in contrast to Nord's treatment) recognizes that an individual within an organization is surrounded by several unique social environments, each of which applies a possibly unique set of reinforcement contingencies for each of several behavioral alternatives.

In addition, the model recognizes that the final forces for behavioral change result from an interaction between the multiple reinforcement contingencies and the amount of value the individual places on the various reinforcements. An example of such an interaction might be an employee's lack of response to a company's new policy of rewarding success by promotion. Such a promotion might mean loss of contact with his peers, whose reinforcement he values highly.

The model has,necessarily, oversimplified the forces of change acting on organizational members. The management or organization and

peer group are only two of many possible sources of reinforcement contingencies. For example, members of one's family are potentially important sources of reinforcement, as suggested by the truism that "behind every great man there is a woman." Other reference groups, such as friends, might also have separate reinforcement contingencies. In addition, reinforcements can change in several ways, all of which will affect the behavior rate. The schedule on which the reinforcement is being administered can change, e.g., from a fixed interval to a variable ratio; or the intensity of the reinforcement can change, e.g., the Christmas bonus changing from $100.00 to $200.00.

The incorporation of learning theory principles into organizational theory appears to have several potential advantages. It provides a developmental framework in which individuals' characteristics (both behavioral and cognitive) are explained in terms of a history of interaction between the individual and environmental contingencies (many of which occur in organizational contexts). Rather than treating characteristics of the individual as constants or as a function of prior interaction with parents, operant conditioners view the individual as having been and still being formed through his interactions with his several environments.

The loose and somewhat circular definition of rewards and punishments utilized by the operant conditioners might also be useful to organization theory. Organizational theorists, e.g., Vroom, 1964, have traditionally considered rewards to be primarily those formally administered by the organization, e.g. salary increase, rise in status, or greater span of control. The operational definition of rewards

utilized by operant conditioners, i.e., any environmental event which increases probability of subsequent occurrence of the response it follows, recognizes a wide variety of reinforcing contingencies. For example, Glaser and Klaus (1966) found that immediate feedback as to the correctness of the response had a large positive impact on subsequent performance for individuals and three-man teams. Social reinforcement from superiors and peers also acted as rewards for individuals. Also, special privileges, e.g., allowing a student an hour of free time at the end of the day, were experienced as rewarding. The literature suggests that a variety of environmental contingencies can act as rewards, if they occur on a fairly systematic schedule.

Implications for Organizational Functioning

In 1954 B. F. Skinner chastised educational institutions for their handling of reinforcement contingencies. He characterized schools as using mostly aversive reinforcement, of allowing great delay between response and reinforcement, of lacking a "shaping" program in which progressive approximations to the final desired complex behavior are reinforced, and of relatively infrequent positive reinforcement. All of these practices act to make schools less effective than they could be in achieving new behavioral and verbal responses in the students. Unfortunately, much the same indictment could be made of other types of organizations as well.

If organizations are to influence systematically the direction of their members' behaviors, they should:

Avoid using punishment as a primary means of obtaining desired behavior.

Positively reinforce desired behavior and ignore undesirable behavior.

Minimize the delay between desired response and reinforcement.

Apply positive reinforcement relatively frequently, preferably on a variable ratio schedule.

Ascertain the response level of each individual and use a shaping procedure to obtain a final complex response.

Ascertain contingencies which are experienced as positive and/or negative by the individual.

Specify the desired behavior in operational terms.

The present model suggests that an organization is mostly likely to cause behavioral change in its members if the multiple sources of contingencies are all reinforcing similar responses. An example of reinforcement of incompatible responses would be in a school situation where the teacher is positively reinforcing high academic performance and the peer group is reinforcing disruptive behavior. Recent research in operant conditioning, e.g., Wodarski, et al (1971), suggests a means by which these two sources of reinforcement can be made congruent. By applying group contingencies (e.g., everyone in the class receives the average score of the lowest four group members), the behavior reinforced by the peers switches radically. The creation of such member interdependence for rewards appears to be a potentially powerful mechanism for forming more congruent reinforcement contingencies.

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